## REMARKS

This amendment is responsive to the Office Action of September 10, 2007. Reconsideration and allowance of claims 1-20 are requested.

## The Office Action

Claims 1 and 12 stand rejected under 35 U.S.C. §102(b) as being anticipated by Mackie, et al. (U.S. Patent Application No. 2002/0080912A1).

Claims 13, 14, 16, and 17 stand rejected under 35 U.S.C. §102(b) as being anticipated by Enos (U.S. Patent No. 4,280,047).

Claims 2-11 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Mackie in view of Enos.

Claims 15 and 18 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Enos.

Claim 19 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Enos in view of Mackie.

## The References of Record

**Mackie** discloses a system for calibrating a linear accelerator. The radiation is emitted from a source **12** in a fan beam or cone configuration through a phantom **32**. The radiation then strikes a liquid ionization chamber matrix detector panel **18** and a portal image **40** is generated that is indicative of the dose measured at the detector panel **18**. The dose changes along the y-axis of the detector panel **18** due to intentional air pockets **42** within the phantom **32** and non-uniform interaction distances with the phantom **32.**

**Enos** discloses a phantom for use in conjunction with an Anger camera nuclear imaging system for evaluating its resolution. Five rows, that is, steps of lead disks are arranged in identical patterns on each step. The steps each have different vertical elevations within the phantom, as shown in FIGURE 2. The phantom is filled with water, to mimic clinical scattering. In this embodiment the phantom emits no radiation. Radioactive material can be added to the water to add random noise, decreasing the contrast and resolution of the phantom.

The basic workings of an Anger camera are explained in Dr. Anger's U.S. Patent 3,011,067 and numerous improvement patents by Dr. Anger and others. (The Anger patent is cited as an MPEP §2144.03 exhibit to help the Examiner understand Enos. Because the undersigned does not consider the Anger patent to be material prior art, no IDS is enclosed) Dr. Anger's camera was an analog device.

The Enos phantom is used to evaluate spatial resolution (col. 3, lines 64-65, col. 4, lines 38-39). Resolution in an Anger camera is effected by its collimator. Large aperture collimators are more efficient because more radiation is utilized, but tend to have lower resolution. Conversely, small aperture collimators tend to be less efficient, but with better resolution. The Enos phantom would be helpful for selecting proper collimation for an Anger camera in accordance with its intended use.

Enos not only is vague about the structure of the well known Anger camera, but is also vague about the location of the radiation source. It is submitted that the radiation source would be a radioisotope source which would be positioned across the imaging region from the Anger detector head, analogous to the radiation source placement commonly used with the Rollo phantom, referenced at col. 1, line 47.

## The Drawings

The Examiner has made an objection to the drawings, indicating that reference numerals **20** and **24** are both used to designate a couch. The Applicant has reviewed the submitted drawings, and is unsure what the Examiner means. The Applicant notes two instances of the patient couch, one in FIG. 1 and a second in FIG. 3, and both are labeled **24**. Clarification would be appreciated.

## The Claims Distinguish Patentably Over the References of Record

**Claim 1** calibrates a solid state detector. Mackie discloses an ionization chamber. Claim 1 calls for a means for emitting radiation concurrently at least at first and second preselected energy levels. Mackie fails to show such a means. The portal image **40** of Mackie is a measure of the **dose** as a function of the position, not the energy level of the incident photons. The high points on the portal image **40** represent where more photons reached the detector **18**, and the low points on the portal image

represent areas where not as many photons reached the detector. Hence, the portal image **40** is greater near the edges, where the beam **14** intersects a smaller portion of the phantom **32**. The air pockets **42** cause the ripples **41** in the portal image **40** because the air is less attenuating than the surrounding water. Thus, the more water of the phantom **32** through which the beam **14** has to pass, the smaller the dose reported by the portal image. The **amount of x-rays** arriving at the detector **18** varies according to position, but the **energy level** of the individual photons remains the same. Mackie does not emit radiation of at least two energy levels concurrently and perform a calibration based on two energy levels.

Moreover, claim 1 calls for a means for determining associated centers of energy peaks and energy values of the generated data sets. Mackie fails to show such a means. The portal image **40** is a dosage plot as a function of position, not an energy histogram. The peaks in the portal image represent areas of higher dose, not higher energy photons. It is therefore respectfully submitted that **claim 1** and **claims 2-11** dependent therefrom distinguish patentably and unobviously over the references of record.

**Claim 4** calls for the second level energy producing means to be a dense metal sheet. Enos shows only circular discs and not a dense metal sheet. This is because Enos is interested in a spatial resolution indicative image of the phantom; whereas the present application is interested in the emitted energy levels, and not an image. Enos uses the discs to block radiation and cast a shadow on the analog detector for determining resolution. Although patentable by virtue of its dependency on claim 1, **claim 4** further distinguishes patentably and unobviously over the references of record.

Similarly, **claim 5** calls for another metal sheet in front of the emissive layer. This relationship does not appear in Enos as the water envelops all of the lead discs. Enos does not show discrete layers. Although patentable by virtue of its dependency on claim 1, **claim 5** further distinguishes patentably and unobviously over the references of record.

**Claim 12** calls for concurrently emitting radiation at at least first and second preselected energy levels. As previously discussed with claim 1, Mackie does not emit radiation of multiple energy levels. Mackie notes varying dosage readings

after the radiation has passed through a detector. Claim 12 is directed to a method of calibrating a solid state detector; whereas Mackie uses an ionization chamber. It is therefore respectfully submitted that **claim 12** distinguishes patentably and unobviously over the references of record.

**Claim 13** calls for a pixilated solid state detector; whereas Enos references an Anger camera, that is, an analog detector with photomultiplier tubes. Claim 13 also calls for a calibration phantom with a radioisotope layer that emits radiation of a first energy. The radioisotope layer is parallel to a metal layer that receives radiation from the radioisotope layer and emits radiation of a second energy upon receiving radiation from the radioisotope layer. Enos fails to show these aspects. Enos shows a water filled phantom. The phantom is filled with water. (col. 2 line 67 – col. 3 line 6) It can be pure water. (col. 2, line 68) The water is used as a scattering medium. (col. 2, lines 28-29) This embodiment of the phantom emits no radiation; it is submitted that the radiation comes from an undisclosed source located opposite the phantom from the detectors. Enos does not contemplate using the phantom as a radiation source for testing the nuclear camera. As the Examiner notes, the water in the phantom may include a radioactive isotope, but that isotope is meant to make noise, reducing the contrast of the phantom, as an image of the lead discs is blurred by the radioisotope in solution. The discs are meant to be attenuation objects. (col. 3 line 21) As such, they are arranged in a deliberate pattern to block incoming radiation to produce the same pattern at the detector.

Moreover, claim 13 calls for the layers to be parallel. In Enos, the water is all around the lead discs, and is not in a parallel relationship with the discs. For the aforementioned reasons, it is respectfully submitted that **claim 13** and **claims 14-19** dependent therefrom distinguish patentably and unobviously over the references of record.

**Claim 20** calls for an energy level calibration phantom. In Enos, radiation from an external source passes through the phantom, and an image is taken to evaluate resolution, contrast, etc. of a final image, but Enos does not calibrate energy levels. Claim 20 calls for one of the energy levels to be generated by secondary emission. Enos does not disclose a dual energy phantom, much less one in

which one of the energy levels is generated by secondary emission. Accordingly, **claim 20** is not anticipated by Enos.

## CONCLUSION

For the reasons set forth above, it is submitted that claims 1-22 distinguish patentably over the references of record and meet all statutory requirements. An early allowance of all claims is requested.

In the event the Examiner considers personal contact advantageous to the disposition of this case, she is requested to telephone Thomas Kocovsky at (216) 861-5582.

Respectfully submitted,

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